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Isochrysis galbana and *Diacronema vlkianum* biomass incorporation in pasta products as PUFA's source

Mónica Fradique [a], Ana Paula Batista [a,b], M. Cristiana Nunes [a,d], Luísa Gouveia [b], Narcisa M. Bandarra [c], Anabela Raymundo [a,d,*]

[a] *Núcleo de Investigação em Engenharia Alimentar e Biotecnologia, Instituto Piaget – ISEIT de Almada, Quinta da Arreinela de Cima, 2800-305 Almada, Portugal*
[b] *Unidade de Bioenergia, Laboratório Nacional de Energia e Geologia (LNEG), Estrada do Paço do Lumiar, 1649-038 Lisboa, Portugal*
[c] *Unidade de Valorização dos Produtos da Pesca e da Aquicultura, INRB/L-IPIMAR, Av. Brasília, 1449-005 Lisboa, Portugal*
[d] *CEER – Engineering Biosystems, Instituto Superior de Agronomia, Tapada da Ajuda, 1349-017 Lisboa, Portugal*

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ABSTRACT

Factors such as an ageing population, increased health care costs and rapid advances in science and technology are likely driving the increase interest among consumers in attaining wellness through diet, which is in turn, fuelling interest in functional foods and changing the way that people eat.

Microalgae have been largely cultured and commercialized as food and feed additives, their potential as source of high-added value compounds and their ability to positively affect human's health due to their original chemical composition, is well known. Considering pasta is a main staple food, the objective of this study was to prepare fresh spaghetti enriched with different amounts of microalgae and to compare the fatty acid profile of pastas before and after cooking, with standard semolina spaghetti.

The results show that fatty acid profile of pastas prepared with *Isochrysis galbana* and *Diacronema vlkianum* biomass incorporation, presented a high resistance to the thermal treatment applied during the cooking procedure. The increase of the amount of the algae lead to a significant increase of EPA (Eicosapentaenoic Acid) and DHA (Docosahexaenoic Acid) both in raw and cooked pastas, omega-3 fatty acids that can be obtained through seafood.

1. Introduction

Pasta products such as macaroni, spaghetti, vermicelli and noodles are manufactured from durum wheat semolina (*Triticum durum*), known to be the best raw material suitable for pasta production due to its unique colour, flavour and cooking quality (Feillet & Dexter, 1996). Semolina is processed by adding water, extruding the dough into the desired shape and drying it under well controlled conditions to prevent the development of cracks (Guinea, Rojo, & Elices, 2004). In recent years, pasta has become more popular due to its low cost, convenience of transportation, long shelf life and nutritional properties, being regarded as a product with low glycaemic index (Bergman, Gualberto, & Weber, 1994; Bjork, Liljeberg, & Ostman, 2000; Cubadda, 1994; Jenkins, Wolever, & Jenkijns, 1988). Nutritionists consider that pasta is highly digestible and provides significant quantities of complex carbohydrates, protein and B vitamins. Pasta is low in sodium, lipids and it has no cholesterol producing a low-postprandial response to glucose and insulin in the blood (Cleary & Brennan, 2006; Douglass & Mathews, 1982; Tudorica, Kuri, & Brennan, 2002). Pastas nutritional quality can be enhanced through the addition of non-traditional raw materials rich in fibres (Brennan, Kuri, & Tudorica, 2003; Chillo, Laverse, Falcone, Protopapa, & Del Nobile, 2008), vitamins and polyunsaturated fatty acids (Iafelice et al., 2008; Verardo et al., 2009). Microalgae could be an interesting alternative raw material to improve pasta nutritional profile, as already showed by the authors (Fradique et al., 2010).

Omega-3 polyunsaturated fatty acids (ω3-PUFA), especially very long chain eicosapentaenoic acid (EPA, 20:5 ω3) and docosahexaenoic acid (DHA, 22:6 ω3), are recognised as having a number of important beneficial health effects (Horrocks & Yeo, 1999; Shahidi & Wanasundara, 1998). EPA and DHA are precursors in the synthesis of prostaglandins, leukotrienes, tromboxanes and resolvins, which bind to specific protein receptors and signal

* Corresponding author. Núcleo de Investigação em Engenharia Alimentar e Biotecnologia, Instituto Piaget – ISEIT de Almada, Quinta da Arreinela de Cima, 2800-305 Almada, Portugal. Tel.: +351 212946274; fax: +351 212946251.
E-mail addresses: hfradique@almada.ipiaget.org (M. Fradique), pbatista@almada.ipiaget.org (A.P. Batista), crnunes@almada.ipiaget.org (M.C. Nunes), luisa.gouveia@ineti.pt (L. Gouveia), narcisa@ipimar.pt (N.M. Bandarra), araymundo@almada.ipiaget.org (A. Raymundo).

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